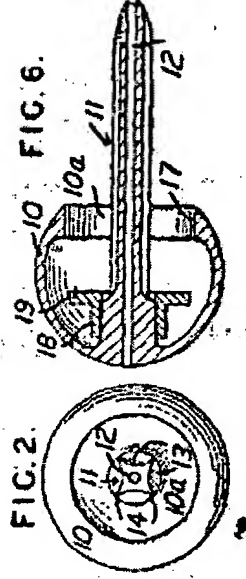


# **An appliance for use as a femoral prosthesis**

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**Publication date:** 1956-12-28  
**Inventor:**  
**Applicant:** FRANK LEONARD JAMES PRYOR;; PRYOR & HOWARD LTD  
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## **Abstract of GB764600**

764,600. Femoral prostheses. PRYOR & HOWARD, Ltd., and PRYOR, F. L. J. April 7, 1955 [April 28, 1954], No. 12322/54. Class 81 (2) A femoral prosthesis is made of non-toxic and inert stainless steel and comprises a hollow spherical cap 10 integral with a stem 11 which passes diametrically through and beyond the cap 10 through an aperture 10a in the cap and which is formed with a central bore 12 having four ribs 14 formed by four concave faces 13. The aperture 10a is formed with a cylindrical face 17 parallel to the longitudinal axis of the stem 11. A washer comprising a cylindrical wall 18 and an outwardly directed flange 19 may be fitted over the inner end of the stem 11 so that the cylindrical wall 18 bears against the inner surface of the cap 10.



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# PATENT SPECIFICATION

764,600



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## COMPLETE SPECIFICATION

### An Appliance for use as a Femoral Prosthesis

We, PRYOR & HOWARD LIMITED, a British Company, of Willow Lane, Mitcham, Surrey, and FRANK LEONARD JAMES PRYOR, a British subject, of the Company's address, do hereby  
5 declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to an appliance for use as a femoral prosthesis.

Various forms of appliance have been proposed and used as femoral prostheses. All such appliances comprise some form of bulb  
15 or cap adapted to engage the acetabulum with or without a spike or stem adapted to be driven into the femur. Previous appliances have suffered from one drawback or another. Thus, one known appliance consists of a  
20 metal cap screwed or otherwise attached to the stem, in which case the component parts of the appliance are apt to become separated under the stresses and strains to which the appliance is subjected in use. Another form  
25 of appliance comprises a stem having three longitudinal ribs formed by three concave faces, but this arrangement lacks stability and one or other of the ribs constitutes a knife-edge fulcrum which is liable to cut into the  
30 bone. According to a more recent development, the appliance is made of acrylic resin with or without a metal reinforcement in the stem, but it has been found that the stem is liable to snap or the resin may crumble or  
35 break away from the reinforcement.

The present invention seeks to provide an appliance which overcomes these disadvantages, and which is better able to withstand without danger of displacement the stresses  
40 and strains to which the appliance is subjected in use.

According to the present invention, an appliance for use as a femoral prosthesis is made of non-toxic and inert stainless steel,  
45 and comprises a hollow spherical cap adapted to engage the acetabulum and a stem for being driven into the femur and formed in-

tegrally with said cap and extending diametrically through the cap and beyond the cap via an aperture formed in the wall there-  
50 of, the stem being formed with a central bore and with four ribs formed by four concave faces.

According to a further feature of the invention, the wall of the cap is thickened around  
55 the aperture through which the stem passes, and an annular shoulder thus formed is provided with a cylindrical face parallel to the longitudinal axis of the stem.

The bore in the stem is necessary to enable  
60 the appliance to be driven into the bone by means of a guiding wire in the usual manner.

The formation of the stem and the cap as a single member considerably increases the strength of the appliance, and the formation  
65 of the stem with four concave faces ensures that a strain in any direction is taken by two ribs of the stem which is a more stable arrangement better able to withstand loosening or displacement than a stem formed with  
70 three concave faces. Furthermore, a two-edge fulcrum is less penetrating to the bone than the single edge fulcrum that applies in the case of a stem formed with three concave  
75 faces.

The dimensions of the appliance are such that the annular shoulder around the opening  
in the cap is adapted to engage the bone, thereby taking some of the thrust and reducing the likelihood of displacement.  
80

The invention will now be described by way of example with reference to the accompanying drawings, in which:—

Figure 1 is a perspective view of the appliance.  
85

Figure 2 is an end view corresponding to Figure 1.

Figure 3 is a horizontal section through the appliance.

Figure 4 illustrates the manner of using the  
90 appliance.

Figure 5 illustrates a washer for use as illustrated in Figure 6 as hereinafter described.

Referring first to Figures 1 to 4, the appliance is machined in one piece from non-toxic and inert stainless steel and comprises a hollow spherical cap 10 adapted to fit into the acetabulum and a diametral stem or pin 11 adapted to be driven into the femur, the stem 11 passing through an opening 10a in the cap 10. The stem 11 is formed with a longitudinal bore 12 for the passage of a guiding wire in known manner and with four concave faces 13 which define four longitudinal ribs 14. This arrangement provides the greatest possible resistance to displacement since any one of the concave surfaces is diametrically opposed by another. The end of the stem 11 is somewhat tapered as indicated at 15 to facilitate its entry into the femur. The wall of the cap 10 is thickened around the opening 10a to form an annular shoulder 16 having a cylindrical surface 17 adapted to engage the bone, thereby assisting the stem 11 in taking up thrust.

The invention also provides a washer for use in cases where a considerable length of bone has to be removed before the appliance is fitted. Such a washer is illustrated in Figure 5 and comprises a cylindrical wall 18 having an outwardly directed flange 19 at one end thereof. The washer is fitted over the stem 11 as indicated in Figure 6 so that the free end of the cylindrical wall 18 comes up against the inner surface of the cap 10. The flange 19 of the washer is then located some distance from the free end of the stem and constitutes an abutment against which the reduced end of the bone can bear.

It will be understood that both the main appliance and the washer may be made in a range of sizes to suit different requirements. For example, the diameter of the cap 10 may vary from 41 to 51 mm. and the length of the stem 11 may be 6, 7 or 8 cm.

What we claim is:—

1. A femoral prosthesis which is made of non-toxic and inert stainless steel and comprises a hollow spherical cap adapted to engage the acetabulum and a stem for being driven into the femur and formed integrally with said cap and extending diametrically through the cap and beyond the cap via an aperture formed in the wall thereof, the stem being formed with a central bore and with four ribs formed by four concave faces.

2. A femoral prosthesis according to Claim 1, wherein the wall of the cap is thickened around the aperture through which the stem passes, and an annular shoulder thus formed is provided with a cylindrical face parallel to the longitudinal axis of the stem.

3. A femoral prosthesis according to Claim 1 or 2, in combination with a washer comprising a cylindrical wall having an outwardly directed flange at one end thereof, said washer being adapted to be fitted over the stem of the appliance so that the unflanged end of the cylindrical wall comes up against the inner surface of the cap of the appliance so that the flange is located some distance from the inner end of the stem and constitutes an abutment against which a bone can bear.

4. A femoral prosthesis substantially as hereinbefore described and as shown in Figures 1 to 3 and 5 and 6 of the accompanying drawings.

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## PROVISIONAL SPECIFICATION

### An Appliance for use as a Femoral Prosthesis

We PRYOR & HOWARD LIMITED, a British Company, of Willow Lane, Mitcham, Surrey, and FRANK LEONARD JAMES PRYOR, a British subject, of the Company's address, do hereby declare this invention, to be described in the following statement:—

This invention relates to an appliance for use in hip prosthesis.

Various forms of appliance have been proposed and used in hip prosthesis. All such appliances comprise some form of bulb or cap adapted to engage the pelvic cavity with or without spike or stem adapted to be driven into the hip bone. Previous appliances have suffered from one drawback or another. Thus, one known appliance consists of a metal cap secured or otherwise attached to the stem, in which case the component parts of the ap-

pliance are apt to become separated under the stresses and strains to which the appliance is subjected in use. Another form of appliance comprises a stem having three longitudinal ribs formed by three concave faces, but this arrangement lacks stability and one or other of the ribs constitutes a knife-edge fulcrum which is liable to cut into the bone. According to a more recent development, the appliance is made of acrylic resin with or without a metal reinforcement in the stem, but it has been found that the stem is liable to snap or the resin may crumble or break away from the reinforcement.

The present invention seeks to provide an appliance which overcomes these disadvantages, and which is better able to withstand without danger of displacement the stresses

and strains to which the appliance is subjected in use.

According to the present invention, an appliance for use in hip prosthesis is made of 5 non-toxic and inert stainless steel, and comprises a hollow spherical cap and a stem formed integrally with said cap and extending diametrically through the cap and beyond the cap via an aperture formed in the wall thereof, 10 the stem being formed with a central bore and with four ribs formed by four concave faces.

According to a further feature of the invention, the wall of the cap is thickened 15 around the aperture through which the stem passes, and the annular shoulder thus formed is provided with an annular face parallel to the longitudinal axis of the stem.

The bore in the stem is necessary to enable 20 the appliance to be driven into the bone by means of a guiding wire in the usual manner.

The formation of the stem and the cap as a single member considerably increases the strength of the appliance, and the formation 25 of the stem with four concave faces ensures that a strain in any direction is taken by two ribs of the stem which is a more stable arrangement better able to withstand loosening or displacement. Furthermore, a two- 30 edged fulcrum is less penetrating to the bone than the single edge.

The dimensions of the appliance are such that the annular shoulder around the opening in the cap is adapted to engage the bone, thereby taking some of the thrust and reducing the likelihood of displacement. 35

The invention also provides a washer for use in cases where a considerable length of bone has to be removed before the appliance is fitted. Said washer comprises an annular 40 wall having an outwardly directed flange at one end thereof. The washer is fitted over the stem so that the upper end of the annular wall comes up against the inner surface of the cap. The flange of the washer is then located 45 some distance from the upper end of the stem and constitutes an abutment against which the reduced upper end of the bone can bear.

It will be understood that both the main appliance and the washer may be made in a 50 range of sizes to suit different requirements.

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